AFP 2859

Practitioner's Docket No. 209529-8157 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Shepard
Application No.: 09/453319 Group No.: 2859
Filed: 12/2/1999 Examiner: Verbitsky
For: Method & Apparatus for Detecting Kissing Unbond Defects

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Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION—37 C.F.R. § 1.192)

NOTE: The phrase "the date on which" an "appeal was taken" in 35 U.S.C. 154(b)(1)(A)(ii) (which provides an adjustment of patent term if there is a delay on the part of the Office to respond within 4 months after an "appeal was taken") means the date on which an appeal brief under § 1.192 (and not a notice of appeal) was filed. Compliance with § 1.192 requires that: 1. the appeal brief fee (§ 1.17(c)) be paid (§ 1.192(a)); and 2.the appeal brief complies with § 1.192(c)(1) through (c)(9). See Notice of September 18, 2000, 65 Fed. Reg. 56366, 56385-56387 (Comment 38).

1. Transmitted herewith, in triplicate, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on April 15, 2004.

NOTE: "Appellant must, within two months from the date of the notice of appeal under § 1.191 or within the time allowed for reply to the action from which the appeal was taken, if such time is later, file a brief in triplicate. . . " 37 C.F.R. § 1.192(a) (emphasis added).

CERTIFICATION UNDER 37 C.F.R. §§ 1.8(a) and 1.10*
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37 C.F.R. § 1.8(a) **37 C.F.R. § 1.10 ***

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☐ facsimile transmitted to the Patent and Trademark Office, (703) _____-_____.

Joyce I Krumpe
Signature

Date: 7/15/04

Joyce Krumpe
(type or print name of person certifying)

07/19/2004 JBALINAN 00000034 09453319

02 FC:2251 55.00 DA

** Only the date of filing (§ 1.6) will be the date used in a patent term adjustment calculation, although the date on any certificate of mailing or transmission under § 1.8 continues to be taken into account in determining timeliness. See § 1.703(f). Consider "Express Mail Post Office to Addressee" (§ 1.10) or facsimile transmission (§ 1.6(d)) for the reply to be accorded the earliest possible filing date for patent term adjustment calculations.*

~~07/19/2004 JBALINAN 00000034 09453319~~

~~01 FC:2402 165.00 DA~~

2. STATUS OF APPLICANT

This application is on behalf of

☐ other than a small entity.

☒ a small entity.

A statement:

☐ is attached.

☒ was already filed.

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 C.F.R. § 1.17(c), the fee for filing the Appeal Brief is:

☒	small entity	$165.00
☐	other than a small entity	$330.00

Appeal Brief fee due $ 165.00

4. EXTENSION OF TERM

NOTE: 37 C.F.R. § 1.704(b) ". . .an applicant shall be deemed to have failed to engage in reasonable efforts to conclude processing or examination of an application for the cumulative total of any periods of time in excess of three months that are taken to reply to any notice or action by the Office making any rejection, objection, argument, or other request, measuring such three-month period from the date the notice or action was mailed or given to the applicant, in which case the period of adjustment set forth in § 1.703 shall be reduced by the number of days, if any, beginning on the day after the date that is three months after the date of mailing or transmission of the Office communication notifying the applicant of the rejection, objection, argument, or other request and ending on the date the reply was filed. The period, or shortened statutory period, for reply that is set in the Office action or notice has no effect on the three-month period set forth in this paragraph."

NOTE: The time periods set forth in 37 C.F.R. § 1.192(a) are subject to the provision of § 1.136 for patent applications. 37 C.F.R. § 1.191(d). See also Notice of November 5, 1985 (1060 O.G. 27).

NOTE: As the two-month period set in § 1.192(a) for filing an appeal brief is not subject to the six-month maximum period specified in 35 U.S.C. § 133, the period for filing an appeal brief may be extended up to seven months. 62 Fed. Reg. 53,131, at 53,156; 1203 O.G. 63, at 84 (Oct. 10, 1997).

The proceedings herein are for a patent application and the provisions of 37 C.F.R. § 1.136 apply.

(complete (a) or (b), as applicable)

(a) ☒ Applicant petitions for an extension of time under 37 C.F.R. § 1.136 (fees: 37 C.F.R. § 1.17(a)(1)-(5)) for the total number of months checked below:

	Extension (months)	Fee for other than small entity	Fee for small entity
☒	one month	$ 110.00	$ 55.00
☐	two months	$ 420.00	$ 210.00
☐	three months	$ 950.00	$ 475.00
☐	four months	$ 1,480.00	$ 740.00
☐	five months	$ 2,010.00	$ 1,005.00

Fee: $ 55.00

If an additional extension of time is required, please consider this a petition therefor.

(check and complete the next item, if applicable)

☐ An extension for _____ months has already been secured, and the fee paid therefor of $_____ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request $_____

or

(b) ☐ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. TOTAL FEE DUE

The total fee due is:

Appeal brief fee $ 165.00

Extension fee (if any) $ 55.00

TOTAL FEE DUE $ 220.00

6. FEE PAYMENT

☐ Attached is a ☐ check ☐ money order in the amount of $_____

☒ Authorization is hereby made to charge the amount of $ 220.00

☒ to Deposit Account No. 50-3145

☐ to Credit card as shown on the attached credit card information authorization form PTO-2038.

WARNING: *Credit card information should* ***not*** *be included on this form as it may become public.*

☒ Charge any additional fees required by this paper or credit any overpayment in the manner authorized above.

A duplicate of this paper is attached.

7. FEE DEFICIENCY

NOTE: If there is a fee deficiency and there is no authorization to charge an account, additional fees are necessary to cover the additional time consumed in making up the original deficiency. If the maximum six-month period has expired before the deficiency is noted and corrected, the application is held abandoned. In those instances where authorization to charge is included, processing delays are encountered in returning the papers to the PTO Finance Branch in order to apply these charges prior to action on the cases. Authorization to change the deposit account for any fee deficiency should be checked. See the Notice of April 7, 1986, *1065 O.G. 31-33.*

☒ If any additional extension and/or fee is required,

AND/OR

☒ If any additional fee for claims is required, charge:

☒ Deposit Account No. 50-3145

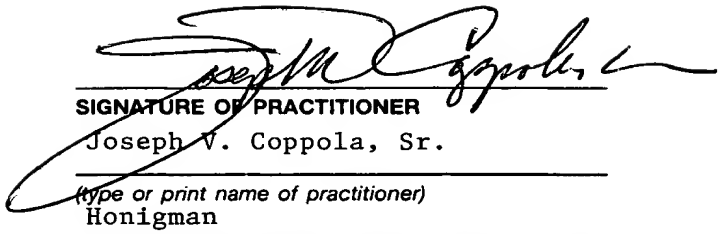
☐ Credit card as shown on the attached credit card information authorization form PTO-2038.

WARNING: *Credit card information should* ***not*** *be included on this form as it may become public.*

Date: 07/15/2004

Reg. No.: 33373

Customer No.: 44200



SIGNATURE OF PRACTITIONER

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Docket No.: 209529-81571 (PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Steven M. Shepard

Application No.: 09/453,319 Group Art Unit: 2859

Filed: December 2, 1999 Examiner: G. Verbitsky

For: Method and Apparatus for Detecting Kissing Unbond Defects

APPELLANT'S BRIEF

Attention: Board of Patent Appeals and Interferences
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This brief is in furtherance of the Notice of Appeal, filed in this case on April 15, 2004.

The fees required under § 1.17(f) and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief is transmitted in triplicate.

This brief contains items under the following headings as required by 37 C.F.R. § 1.192 and M.P.E.P. § 1206:

I. Real Party In Interest
II Related Appeals and Interferences
III. Status of Claims
IV. Status of Amendments
V. Summary of Invention
VI. Issues
VII. Grouping of Claims
VIII. Arguments

IX. Claims Involved in the Appeal
Appendix A Claims Involved in the Appeal

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Thermal Wave Imaging, Inc. of 845 Livernois, Ferndale, Michigan 48220. A properly executed Assignment by the sole inventor to Thermal Wave Imaging, Inc. has been recorded by the U.S. Patent and Trademark Office at reel 010910, frame 0340.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

1. Total Number of Claims in Application

There are 28 claims pending in application.

2. Current Status of Claims

1. Claims canceled: 29

2. Claims withdrawn from consideration but not canceled: None

3. Claims pending: 1-28

4. Claims allowed: 15-17

5. Claims rejected: 1, 3, 18-19 and 27-28

6. Claims objected to: 2, 4-14 and 20-26

3. Claims On Appeal

The claims on appeal are claims 1-14 and 18-28.

IV. STATUS OF AMENDMENTS

The United States Patent Office mailed the first Office Action on the merits on February 13, 2001, wherein the Examiner rejected all of pending claims 1-28. Claims 6 and 7-14 were objected to because of various informalities, and claims 6 and 7-14 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Further, claims 1, 3 and 18 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,201,841 to Lebeau et al. (hereinafter "Lebeau") in view of U.S. Patent No. 6,000,844 to Cramer et al. ("Cramer"). Additionally, claims 2, 4-6, 15-16 and 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lebeau and Cramer as applied to claims 1, 3 and 18, and further in view of U.S. Patent No. 5,587,532 to Rose and U.S. Patent No. 4,752,140 to Cielo et al. ("Cielo"). Moreover, claims 19-22 and 24-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lebeau, Cramer, Rose and Cielo as applied to claims 1-6, 15-16 and 23, and further in view of the "Thermography and Ultrasonic Finds Flaws in Composites" article. Finally, claims 27 and 28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lebeau and Cramer as applied to claims 1, 3 and 18, and further in view of U.S. Patent No. 5,709,469 to White et al. ("White").

Appellant responded on July 12, 2001 by filing an amendment that amended claims 1, 6-15, 18, 20 and 23. Additionally, Appellant submitted arguments distinguishing the invention defined by the pending claims from that taught by the references cited in the first Office Action.

A second Office Action was mailed on September 14, 2001. In this Office Action, the Examiner rejected claims 1, 3 and 18 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,111,048 to Devitt et al. (hereinafter "Devitt") in view of U.S. Patent No. 6,286,206 to Li. Claims 2, 4-6, 15-16 and 23 were also rejected under 35 U.S.C. §103(a) as being unpatentable over Devitt, Li and Cramer as applied to claims 1, 3 and 18, and further in view of Rose and Cielo. Moreover, claims 19-22 and 24-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Devitt, Li, Cramer, Rose and Cielo as applied to claims 1-6, 15-16 and 23, and further in view of "Thermography and Ultrasonic Finds Flaws in Composites." Finally, claims 27 and 28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Devitt, Li and Cramer as applied to claims 1, 3 and 18, and further in view of White. Claims 7-14 and 17 were deemed to be allowable if rewritten to include all of the

limitations recited in the base claim from which they depended, as well as any intervening claims.

Appellant responded by filing a Response on December 14, 2001 submitting arguments distinguishing the invention defined by the pending claims from that taught by the references cited in the second Office Action.

A third Office Action was mailed on May 8, 2002. In this Office Action, the Examiner rejected claims 1, 3, 18-19 and 27-28 under 35 U.S.C. §102(b) as being anticipated by Devitt. Claims 2, 4-17 and 20-26 were deemed to be allowable if rewritten to include all of the limitations recited in the base claim from which they depended, as well as any intervening claims.

Appellant responded on October 2, 2002 by filing an amendment that amended claims 1 and 18, and added new claim 29. Additionally, Appellant submitted arguments distinguishing the invention defined by the pending claims from that taught by the references cited in the third Office Action.

A fourth Office Action, made final, was mailed on December 31, 2002. In this Office Action, claims 6 and 7-14 were rejected under 35 U.S.C. §112, first paragraph, as being based on disclosure that was not enabling. Additionally, the Examiner rejected claims 1, 3, 18-19 and 27-28 under 35 U.S.C. §102(b) as being anticipated by Devitt. Claim 29 was rejected under 35 U.S.C. §103(a) as being unpatentable over Devitt in view of Lebeau. Claims 15-17 were allowed and claims 2, 4-17 and 20-26 were deemed to be allowable if rewritten to include all of the limitations recited in the base claim from which they depended, as well as any intervening claims.

Appellant responded on March 19, 2003 by filing an amendment that amended claims 1, 18 and 29. Additionally, Appellant submitted arguments distinguishing the invention defined by the pending claims from that taught by the references cited in the fourth Office Action.

The Examiner responded to the Response After Final Rejection in an Advisory Action mailed April 9, 2003. In the Advisory Action, the Examiner failed to enter the

amendments proposed in Applicants October 2, 2002 response, because the proposed amendments allegedly raised new issues that would require further consideration and/or search and were not deemed to place the application in better form for appeal.

In response to the Advisory Action mailed April 9, 2003, Appellant filed a Request For Continued Examination (RCE) on April 30, 2003 and asked that the Examiner consider the amendment previously filed on March 19, 2003.

A first Office Action after the RCE was mailed on July 23, 2003. In this Office Action, the Examiner rejected claims 1, 3, 18-19 and 27-28 under 35 U.S.C. §102(b) as being anticipated by Devitt. Claim 29 was rejected under 35 U.S.C. §103(a) as being unpatentable over Devitt in view of Lebeau. Claims 15-17 were allowed and claims 2, 4-17 and 20-26 were deemed to be allowable if rewritten to include all of the limitations recited in the base claim from which they depended, as well as any intervening claims.

Appellant responded on October 22, 2003 by filing an amendment that amended claims 1 and 18. Additionally, Appellant submitted arguments distinguishing the invention defined by the pending claims from that taught by the references cited in the first Office Action after the RCE.

A second Office Action after the RCE, made final, was mailed on January 16, 2004. In this Office Action, the Examiner rejected claims 1, 3, 18-19 and 27-28 under 35 U.S.C. §103(a) as being unpatentable over Devitt in view of U.S. Patent No. 4,232,554 to Aleck. Claims 15-17 were allowed and claims 2, 4-17 and 20-26 were deemed to be allowable if rewritten to include all of the limitations recited in the base claim from which they depended, as well as any intervening claims.

In response to the Office Action dated January 16, 2004, a notice of appeal was filed on April 15, 2004.

A copy of the claims involved in the present appeal is attached hereto as Appendix A. The claims in Appendix A include the amendments as filed by Applicant on October 22, 2003.

V. SUMMARY OF INVENTION

Active thermographic methods are often used to detect subsurface defects in a test specimen; that is, defects that are not readily ascertainable by viewing the specimen's surface. Thermographic methods usually involve heating the surface of a specimen and monitoring the subsequent heat signature radiated over a period of time from the specimen by way of an infrared camera. Subsurface air gaps or vacuums (defects) within the tested specimen are good thermal insulators when compared with the surrounding material and, therefore, will appear as a high-contrast thermal discontinuity in the thermographic image sequence due to the differences in heat flow between the defect and the surrounding defect-free area.

In some cases, however, the subsurface defect does not appear clearly in a thermographic image sequence because the subsurface walls of the defect are in mechanical contact, allowing at least some heat flow across the defect. This type of defect is often called a "kissing unbond" defect and is illustrated in Figure 1A adjacent this paragraph. As can be seen in Figure 1A, the upper 106 and lower 108 walls of the defect 100 touch each other. Conventional active thermographic methods often cannot detect this type of defect because the mechanical contact between the subsurface walls of the defect provides partial thermal conduction rather than a large thermal discontinuity, thereby decreasing the thermal contrast in the thermographic images. This sometimes occurs in bonded or laminated structures, where unbonded, partially bonded, or delaminated subsurface areas in the joint may appear completely bonded in the thermographic image sequence.

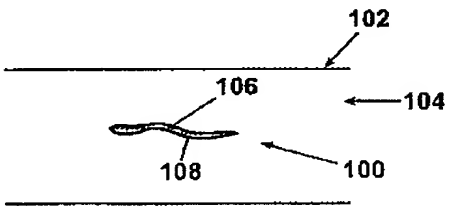

Fig. 1A

The present invention detects a kissing unbond-type subsurface defect in a specimen by changing the dimensions of the defect while or immediately after the part is heated. The specimen's surface temperature is then monitored over time to detect the defect, particularly the exacerbated thermal discontinuity caused by the change in dimension of the defect.

In an embodiment, the invention includes an image generator, such as an infrared camera, and means for changing the pressure on a surface of the specimen being tested to stress and unstress the specimen. The pressure changes cause the walls of the kissing unbond defect to move relative to each other, separating and/or shifting the walls of the defect to exacerbate the thermal discontinuities in the specimen and increasing the thermal contrast between the defect and the surrounding material.

In a particular implementation, the pressure changes are created by applying a vacuum to generate a tensile force on the surface of the specimen, which displaces the specimen surface at areas containing kissing unbond defects, or applying acoustic, ultrasonic, or mechanical energy at selected time intervals (contemporaneous with or after heating the specimen), to shift the unbonded surfaces with respect to each other. As the degree of contact in the defect's walls is altered, sequential thermographic images of the sample are obtained over time as heat flows through the specimen, revealing defects that may otherwise be undetectable by conventional techniques.

VI. ISSUE

In the January 16, 2004 Final Office Action, the Examiner rejected claims 1, 3, 18, 19 and 27-28 under 35 U.S.C. §103(a) as being unpatentable over Devitt in view of Aleck. Thus, the issue presented on appeal is whether claims 1, 3, 18, 19 and 27-28 are unpatentable over Devitt in view of Aleck.

VII. GROUPING OF CLAIMS

For purposes of this appeal brief only, and without conceding the teachings of any prior art reference, claims 1-14 and 18-28 stand or fall together as a group.

VIII. ARGUMENTS

Claims 1, 3, 18, 19 and 27-28 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Devitt in view of Aleck. In the January 16, 2004 Final Office Action, the Examiner stated that "Devitt discloses in FIG. 1 a device and method of applying a mechanical stress with stressing fixtures (means for applying force with attachments) 12 and 68 to a

component/sample/specimen 18 already having a crack or (purely) subsurface defect so that the crack becomes detectable/exacerbated (col. 7, lines 28-46) by applying the mechanical stress of sufficient value to exacerbate the crack...." The Examiner also acknowledged that "Devitt does not explicitly state that stress is not sufficient to cause the defect to migrate (propagate) towards the specimen's surface, as stated in claim 1." To make up for this deficiency, the Examiner cited the Aleck reference and argued that "Aleck discloses a method (device) of detecting a flaw (crack/defect/kissing unbond) at loads/stresses below those which (insufficient to) cause the flaws to propagate. This would imply that the defect /flaw does not move toward a surface but stays in place. Therefore it would have been obvious ...to apply the stress/load below those which cause the flaw to propagate, to the device disclosed [in] Devitt, as taught by Aleck, in order to avoid a damage to the specimen being tested."

According to MPEP 2143, three basic criteria must be met to establish a *prima facie* case of obviousness under 35 U.S.C. §103(a). First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

As will be shown below, Devitt and Aleck, either alone or in combination, fail to teach or suggest each of the limitations recited in claims 1, 3, 18, 19 and 27-28. However, even if Devitt and Aleck taught or suggested each of the recited claim limitations, which they do not, there is still no motivation to combine the teachings of Devitt and Aleck.

1. **Devitt and Aleck Fail To Teach Or Suggest Applying a Force to "Excaerbate A Thermal Discontinuity"**

As noted above, the Examiner contends that "Devitt discloses in FIG. 1 a device and method of applying a mechanical stress with stressing fixtures (means for applying force with attachments) 12 and 68 to a component/sample/specimen 18 already having a crack or (purely)

subsurface defect *so that the crack becomes detectable/exacerbated* (col. 7, lines 28-46) by applying the mechanical stress of sufficient value *to exacerbate the crack....*" Whether or not Devitt teaches applying a force to "exacerbate a crack" is irrelevant to determining the patentablility of the claimed invention. What *is* relevant is that Devitt fails to teach or suggest applying a force to a specimen, wherein the magnitude of the force is sufficient to *exacerbate a thermal discontinuity* caused by a subsurface kissing unbond defect, as recited in claim 1.

To fully appreciate the differences between the invention recited in claim 1 and the Devitt reference, one need look no further than the manner in which the Devitt device operates. First, the teachings of Devitt are primarily focused on detecting *surface* defects (e.g. col. 6, lines 5 et seq., lines 22 et seq., lines 39 et seq., lines 43 et seq., lines 55 et seq., lines 58 et seq.), not *subsurface* defects. To detect these surface defects, Devitt heats the surface of the test sample with a laser beam (or other method such as a flash lamp) until a uniform surface temperature of the sample is reached. *See* Devitt, col. 5, lines 55-60. Once this uniform temperature is reached, the surface of the sample is scanned by a radiometer 16 and defects 59 in the surface of the sample are displayed graphically on a video display 44. *See* Devitt, col. 5, lines 60-65. Any defects along the surface of the sample will appear as a peak 62 (*see* FIG. 2B) or "thermal discontinuity" as so defined by the Examiner. *See* Devitt, col. 6, lines 5-8. The laser beam is then scanned across the preheated surface causing selective, localized heating of the surface. *See* Devitt, col. 6, lines 9-11. The radiance emitted from the surface of the sample is detected by the radiometer 16 and converted into a graph 60' (see FIG. 2C). The graph 60' will peak (indicated by reference numeral 64 in FIG. 2C) as the laser beam passes over the surface defect because of the higher absorption and emittance of the defect relative to the surrounding surface material. *See* Devitt, col. 6, lines 12-16.

Devitt also recognizes that some defects are subsurface defects (i.e. defects that lie proximate to the surface under inspection). In the case of subsurface defects, a stress may be applied to the sample to "cause the subsurface defect to open at [the] surface" so that it will be detectable at the surface of the sample. *See* Devitt, col. 7, lines 27-40. The teaching of Devitt is clear that in order to detect a thermal discontinuity (manifested by a peak in the graph 60, 60'), there must be either a defect present at the *surface* of a sample, or, in the case of a subsurface defect, a surface defect must be ***created*** by causing the subsurface defect to "open at [the]

surface." Therefore, any "thermal discontinuity" caused by a subsurface defect in the Devitt sample is not ***exacerbated*** by the application of a force on the sample, as required by the claimed invention; but rather, the "thermal discontinuity" is ***created*** by the application of force. ***Exacerbating*** and ***creating*** are neither synonymous concepts, nor is one obvious in view of the other.

Although the Examiner relies on Aleck for its supposed teaching of non-propagating defects, Aleck fails to make up for the deficiencies of Devitt noted above. Particularly, Aleck fails to teach or suggest a method for non-destructively evaluating a specimen for the presence of subsurface kissing unbonds that includes the step of applying a force to a specimen, wherein the magnitude of the force is sufficient to *exacerbate a thermal discontinuity* caused by a subsurface kissing unbond defect, as recited in claim 1. While Aleck does teach loading a structure and positioning detection means in thermal proximity to the structure for detecting thermal emission signals indicative of plastic formation, Aleck does not teach heating the specimen *and* applying a force to the specimen. Even if the application of force described in Aleck could be deemed "heating the specimen," there is no "*exacerbating* the thermal discontinuity," since the application of force would merely *create* the thermal discontinuity. In other words, like Devitt, Aleck applies a force to the sample to *create* the thermal discontinuity, not exacerbate it. Since Devitt and Aleck, either alone or in combination, fail to teach or suggest each of the limitations recited in claims 1, a *prima facie* case of obviousness has not been established.

2. There Is No Motivation To Combine The Teachings Of Devitt And Aleck

Even assuming *arguendo* that the combination of Devitt and Aleck teach or suggest each of the claim limitations recited in independent claims 1 and 18, there is still no motivation to combine the reference teachings. More particularly, Devitt teaches applying a force to a test sample to encourage growth of a subsurface defect such that the subsurface defect will ***create*** a surface defect (as noted above, Devitt is only effective for analyzing *surface* defects). In contrast, Aleck specifically teaches away from the destructive nature of analysis methods that facilitate or cause defect propagation. The following excerpts from the "Background of the Invention" section of the Aleck reference illustrate the inherent limitations of defect growth:

> "One type of flaw detection technique which depends upon cyclic loading is acoustic emission. The measured signal depends upon the tearing sounds associated with flaw growth. However, by the time a flaw has propagated sufficiently for detection, the useful life of the structure being tested may have been materially shortened. *Thus, in many high reliability applications the effect of flaw propagation in conjunction with structural testing is clearly undesirable.*" (*See* Aleck, col. 1, lines 58-66, emphasis added).

> "It is apparent that one of the limitations of the acoustic emission flaw detection technique is its inherent dependency upon flaw growth. *In the testing of high reliability component structures this is clearly undesirable, since the resulting flaw propagation may appreciably shorten the useful life of the structure being tested.*" (*See* Aleck, col. 2, lines 17-22, emphasis added).

> "Accordingly, it is an object of the invention to provide an improved method for nondestructively detecting even very small flaws in a structure. More specifically, it is an object of the invention to overcome the aforementioned limitations associated with the acoustic emission flaw detection technique." (*See* Aleck, col. 2, lines 23-28).

Moreover, combining Aleck's teaching of applying a stress/load below those which would cause a flaw or defect to propagate would render the method disclosed in Devitt inoperable since the Devitt defect would not propagate to the surface of the sample. Again, as noted above, Devitt teaches a method for analyzing *surface* defects, not *subsurface* kissing unbond defects as recited in claims 1 and 18. Failure of a defect in the Devitt sample to propagate to the surface of the sample would render the defect undetectable by the Devitt radiometer 16. Since there is no motivation to combine the teachings of Devitt and Aleck, a *prima facie* case of obviousness has not been established.

For all the above reasons, Appellant submits that claims 1-14 and 18-28 are allowable and respectfully request that the application be allowed to pass to issue.

VIII. CLAIMS INVOLVED IN THE APPEAL

A copy of the claims involved in the present appeal is attached hereto as Appendix A.

Dated: July 15, 2004

Respectfully submitted,

By _____
Joseph V. Coppola, Sr.
Registration No.: 33,373
Honigman Miller Schwartz and Cohn LLP
32270 Telegraph Rd, Suite 225
Bingham Farms, Michigan 48025-2457
(248) 566-8500
Attorney for Applicant

APPENDIX A

Claims Involved in the Appeal of Application Serial No. 09/453,319

1. (Previously presented) A method for non-destructively evaluating a specimen for the presence of subsurface kissing unbond defects, comprising the steps of:

heating the specimen;

applying a force to the specimen, wherein the magnitude of the force is sufficient to exacerbate a thermal discontinuity caused by said subsurface kissing unbond defect, wherein said force is insufficient to cause the subsurface kissing unbond defect to migrate toward a specimen surface; and

generating an infrared image to detect the presence of a subsurface kissing unbond defect.

2. (Original) The method of claim 1, wherein the applying step includes decreasing air pressure in a vicinity of the specimen to change the at least one dimension of the subsurface defect.

3. (Original) The method of claim 1, wherein the applying step includes disturbing the specimen using ultrasonic, acoustic or mechanical energy.

4. (Original) The method of claim 1, wherein the applying step includes:

placing the specimen in a chamber; and

generating a vacuum in the chamber to change at least one dimension of the subsurface defect.

5. (Original) The method of claim 1, wherein the applying step includes:

placing a sealed enclosure on the surface of the specimen; and

generating a vacuum in the sealed enclosure to change the at least one dimension of the subsurface defect.

6.(Previously Presented) The method of claim 5, wherein the sealed enclosure is divided into two sections such that the vacuum generated in said vacuum generating step produces a vacuum in one of the two sections.

7. (Previously Presented) The method of claim 1, wherein said applying step includes increasing and decreasing the force on the specimen surface, wherein said image generating step includes generating a first thermographic image when the force is increased and generating a second thermographic image when the force is decreased, and wherein the method further comprises the step of comparing the first and second thermographic images to detect the subsurface defect.

8. (Previously Presented) The method of claim 7, wherein the image generating step generates a plurality of first thermographic images and a plurality of second thermographic images over time, and wherein the comparing step is conducted by calculating the difference of the sums of the first thermographic images and the second thermographic images.

9. (Previously Presented) The method of claim 7, wherein the image generating step generates a plurality of first thermographic images and a plurality of second thermographic images over time, and wherein the comparing step includes generating histograms corresponding to the plurality of first and second thermographic images and comparing the histograms for the plurality of first thermographic images with the histograms for the plurality of second thermographic images.

10. (Previously Presented) The method of claim 7, wherein the image generating step generates a plurality of first thermographic images and a plurality of second thermographic images over time, and wherein the comparing step includes mathematically correlating the plurality of first thermographic images with the plurality of second thermographic images.

11. (Previously Presented) The method of claim 7, wherein the image generating step generates a plurality of first thermographic images and a plurality of second thermographic images over time, and wherein the comparing step includes viewing an image corresponding to

the ratio between the plurality of the first thermographic images and the plurality of the second thermographic images.

12. (Previously Presented) The method of claim 7, wherein the image generating step generates a plurality of first thermographic images and a plurality of second thermographic images over time, and wherein the comparing step includes visually comparing the plurality of first thermographic images and the plurality of second thermographic images.

13. (Previously Presented) The method of claim 7, wherein the applying step includes placing the specimen in a chamber before said image generating step.

14. (Previously Presented) The method of claim 7, wherein the applying step includes placing a sealed enclosure on the specimen surface before said image generating step.

15. (Previously Presented) A method for non-destructive evaluation of a specimen, comprising the steps of:

heating the specimen;

placing a sealed enclosure on a surface of the specimen;

applying a vacuum to at least a portion of the surface of the specimen by decreasing the air pressure in the sealed enclosure, wherein the vacuum from the applying step enlarges at least one dimension of the subsurface defect to create a thermal discontinuity; and

generating an infrared image to detect the presence of a subsurface defect.

16. (Original) The method of claim 15, wherein the sealed enclosure is divided into two sections such that the vacuum generated in said applying step produces a vacuum in one of the two sections.

17. (Original) The method of claim 15, wherein said applying step further includes the step of increasing the air pressure in the sealed enclosure, wherein said generating step includes generating a first active thermographic image when the pressure is increased and generating a second active thermographic image when the pressure is decreased, and wherein the method

further comprises the step of comparing the first and second active thermographic images to detect the subsurface defect.

18. (currently amended) An apparatus for non-destructively evaluating a specimen for the presence of subsurface kissing unbond defects comprising:

a heat-sensitive image generator that generates thermographic images;

a heater that increases the temperature of the specimen; and

means for applying a force to the specimen, wherein the force applied by the applying means is sufficient to change at least one dimension of the subsurface kissing unbond defect to create a thermal discontinuity, wherein the force applied by the applying means is insufficient to cause the subsurface kissing unbond defect to migrate toward a specimen surface.

19. (Original) The apparatus of claim 18, wherein said heater is at least one flashlamp that directs heat to the specimen surface.

20. (Previously Presented) The apparatus of claim 18, wherein said applying means includes:

a sealed enclosure that is placed on the specimen's surface; and

a vacuum pump that generates a vacuum inside the sealed enclosure.

22. (Original) The apparatus of claim 20, wherein the heater is a flashlamp disposed inside the sealed enclosure to direct light to the specimen surface.

23. (Previously Presented) The apparatus of claim 18, wherein said applying means includes:

a chamber for holding the specimen; and

a vacuum pump that generates a vacuum inside the chamber.

24. (Previously Presented) A method for non-destructively evaluating a specimen for the presence of kissing unbond defects, comprising the steps of:

heating the specimen;

applying a force to the specimen, wherein the magnitude of the force is sufficient to exacerbate a thermal discontinuity caused by a subsurface kissing unbond defect of said specimen; and

generating an infrared image to detect the presence of a subsurface kissing unbond defect, wherein the applying step includes disturbing the specimen using ultrasonic or acoustic energy.

25. (Original) The apparatus of claim 23, wherein the chamber includes a window, wherein the heater is a flashlamp located inside the chamber and directs light on the specimen to heat the specimen, and wherein at least part of the image generator is located outside the chamber.

26. (Original) The apparatus of claim 23, wherein at least one of the heater and the image generator are located inside the chamber.

27. (Original) The apparatus of claim 18, wherein said heater is a lamp that continuously directs heat to the specimen, and wherein said applying means includes an attachment that couples to the surface of the specimen to apply the force.

28. (Original) The apparatus of claim 27, wherein said attachment provides the force via ultrasonic, acoustic, or mechanical energy.

29. (Cancelled)